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AUTHOR Bilir, Sule; And Others
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ABSTRACT

This study, conducted in Ankara, Turkey, compared motor development in 48 normal children (ages 3 to 6), 12 children (ages 5 to 7) with Down syndrome, and 33 children (ages 3 to 7) with hearing impairments. The Motor Development Section of the Portage Early Childhood Educational Program checklist was administered to all the children. Results revealed that motor skills developed more slowly in the hearing impaired children and the Down syndrome children than in the normal children. In comparison with the normal children, the hearing impaired children seemed to perform more poorly in skills associated with balance and general coordination than in other skills. The Down syndrome children demonstrated poorer performance than the normal children in all motor skills. This was attributed to the hypotonic muscles typical of children with Down syndrome. Results support the systematic inclusion of physical education activities in programs for children with disabilities. (DB)

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ED 390 210

A COMPARISON STUDY OF GROSS MOTOR DEVELOPMENT SKILLS OF NORMAL, HEARING-IMPAIRED AND DOWN SYNDROME CHILDREN

Prof. Şule BİLİR, Prof. Nergis GÜVEN,
Assoc. Prof. Servet BAL, Assoc. Prof. Nilgün METİN,
Assis. Prof. İsmihan ARTAN

The Department of Child Health and Education, Hacettepe University,
ANKARA-TURKEY

This is a descriptive study designed to examine the skills associated with gross motor development in 3-6-year-old normal children, 3-7-year-old hearing impaired children, and 5-7-year-old with Down's Syndrome. The subjects included in this study consisted of 48 3-6-year-old normal children and 12 5-7-year-old children with Down's Syndrome, all attending a kindergarten affiliated with the Department of Child Health and Education, Hacettepe University, Ankara, Turkey. Also included among the subjects were 33 hearing-impaired children in the 3-7-year age group, all attending a school for the deaf called "Kemal Yurtbilir Sağırlar Okulu" To obtain data, those items on the Motor Development Section of the Portage Early Childhood Educational Program checklist regarding gross motor development were used. The results obtained revealed that motor skills developed more slowly in hearing impaired children as well as in those with Down's Syndrome than in normal children. In comparison to normal children, hearing impaired children seem to perform more poorly in skills associated with balance and general co-ordination than in other skills due to the disadvantages resulting from their handicaps.

The subjects included in this study consisted of 48 3-6-year-old normal children and 12 5-7-year-old children with Down's syndrome, all attending a kindergarten affiliated with the Department of Child Health

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and Education, Hacettepe University, Ankara, Turkey. Also included among the subjects were 33 hearing-impaired children in the 3-7-year age group, all attending a school for the deaf called "Kemal Yurtbilir Sağırlar Okulu".

To obtain data, those items on the Motor Development Section of the Portage Early Childhood Educational Program checklist regarding gross motor development were used.

The results obtained revealed that motor skills developed more slowly in hearing impaired children as well as in those with Down's syndrome than in normal children. In comparison to normal children, hearing impaired children seem to perform more poorly in skills associated with balance and general co-ordination than in other skills due to the disadvantages resulting from their handicaps.

Our study also revealed that the children with Down's syndrome generally performed more poorly than normal children in all skills due to the hypotonic nature of their muscles.

Motor development refers to the ability acquired by the organism to perform a range of voluntary activites depending on the level of development of the central nervous system and physical growth (1).

The range of motor skills gained by a child during the first two years of life forms the basis for all the motor skills to be gained in later years.

As far as activities go, children undergo a sequence of developments from birth until two years of age, this sequence consists of reaching for objects, grasping objects, holding head erect, turning to side, sitting, crawling, taking a few steps with support and walking (2, 3).

A child acquires the basic skills during the period between the second and the seventh years of life. The basic skills consist of activites such as running, hopping; jumping; catching, throwing, and kicking a ball. Such skills are referred to as "Basic Skills" since all children have them, and since they are the essential skills for survival (1,3).

Hearing impaired children also go through the same stages of development between 0-2 years of age as normal children. However, studies show that hearing impaired children suffer from certain problems of balance and general co-ordination in later years (4,5).

In a study by Weiegersma and Van der Velde, it was emphasized that children only with hearing impairment were less successful than their normal peers in performing actions that require dynamic co-ordination such as walking the balance board forward and backward, bouncing and jumping, as well as hopping on one foot forward and backward on a line (4).

In children with Down's syndrome, the development of motor skills is rather slow during the first year of life, and very rarely they are capable of sitting at the age of one.

Longer than normal time intervals exist between standing, taking a few step without support and walking. Children with Down's syndrome

generally begin to walk at around three years of age. They cannot exhibit a proper motor control until the age of six (6, 7).

Due to the hypotonic nature of their muscles, children with Down's syndrome suffer from difficulties in balancelocomotion, hand-eye-foot coordination, and in motor skills involved in rapid movement (6,7).

Studies by Zuhulin (1974) showed that the development of motor skills in 6-10-year-old children with Down's syndrome was slow compared to both normal children and those with mental retardation but not with Down's Syndome although they exhibited a similar level of I.Q.

This is a descriptive study designed to examine the skills associated with gross motor development in 3 to 6-year-old normal children, 3-7-year-old children with severe hearing impairment and 5 to 7-year-old with Down's Syndrome.

METHOD

SUBJECTS

The subjects included in this study consisted of 48, 3 to 6-year-old normal children, 12, 5-to 7-year old children with Down's syndrome, all attending a kindergarten affiliated with the Department of Child Health and Education, Hacettepe University. Also included among the subjects were 33, 3 to 7-year-old children with profound hearing impairment, attending a school for the deaf (Kemal Yurtbilir Sağırlar Okulu).

Table 1 : Age distribution of all subjects included in this study (Ankara, 1992).

Age / Children	3-4 years (37-48 months)	4-5 years (49-60 months)	5-6 years (61-72 months)	6-7 years (73-84 months)
Normal	16	16	16	-
Profound Hearing Impaired	7	6	9	11
With Down's Syndrome	-	-	6	6

The Research data was collected during the period between January and February, 1992.

EQUIPMENT

For data collection, the Motor Development Section of the Portage Early Childhood Educational Program Checklist was used. Those items were selected from this section which dealt with gross motor development. Some items on the list could not be used due to lack of necessary equipment. In the tables below, such items were marked "IMP", standing for "impossible".

TEST PROCEDURE

The motor development skills exhibited by hearing impaired children and normal children as well as those with Down's syndrome were assessed on the basis of the skills listed in the Motor Development Section of the Portage Early Childhood Educational Program Checklist for children in the age groups ranging from 3-4, 4-5 and 5-6 years. The test rooms at the institutions included in the study were equipped by the researchers with the materials listed in the Portage Educational Program Checklist. Each subject was admitted to the test room alone, and those items of the Portage Motor Development Checklist corresponding to the age group of the subject were applied. The child's performance was rated (+), if it was successful, and (-), if not so. The results were recorded in the registration form if a test item could not be applied due to lack of equipment, it was marked (IMP), standing for "IMPOSSIBLE".

STATISTICAL ANALYSIS

The data thus collected was analyzed in terms of percents, and graphics were used to illustrate the results.

FINDINGS

This study examined the skills associated with gross motor development in 3 to 6-year-old normal children, 3 to 7-year-old children with serious hearing impairment and 5 to 7-year-old with Down's syndrome on the basis of the Portage Early Childhood Educational Program Motor Development Checklist. Tables 2-5, and Figures 1-4 present the findings.

Table 2 and Figure I show the distribution of the skills associated with gross motor development in 3 to 4-year-old normal and hearing impaired children.

Table 2: The Distribution of Skills Associated With Gross Motor Development in Normal As Well As Hearing Impaired Children in The 3-4 Year Age Group (Ankara, 1992).

Children / Skills	Normal (n:16)		Hearing Impaired (n:7)	
	Successful		Successful	
	No	%	No	%
Jumps from height of 20 cm	16	100.00	7	100.00
Kicks large ball when rolled to him	16	100.00	5	71.43
Walks on tiptoe	14	87.50	6	85.71
Runs 10 steps (With coordinated, alternating arm movement).	16	100.00	7	100.00
Pedals tricycle 150 cm.	*IMP		* IMP	
Walks at a quick pace	16	100.00	7	100.00
Climbs up and slides down 120-180 cm slide.	*IMP		*IMP	
Somersaults forward	9	56.25	0	0.00
Walks upstairs,alternating feet	16	100.00	7	100.00
Marches	16	100.00	6	85.71
Catches ball with 2 hands	16	100.00	6	85.71

* IMPOSSIBLE

Figure 1. The Distribution Of Skills Associated With Gross Motor Development in Normal As Well As Hearing İmpaired Children In The 3-4 -Year Age Group (Ankara, 1992).

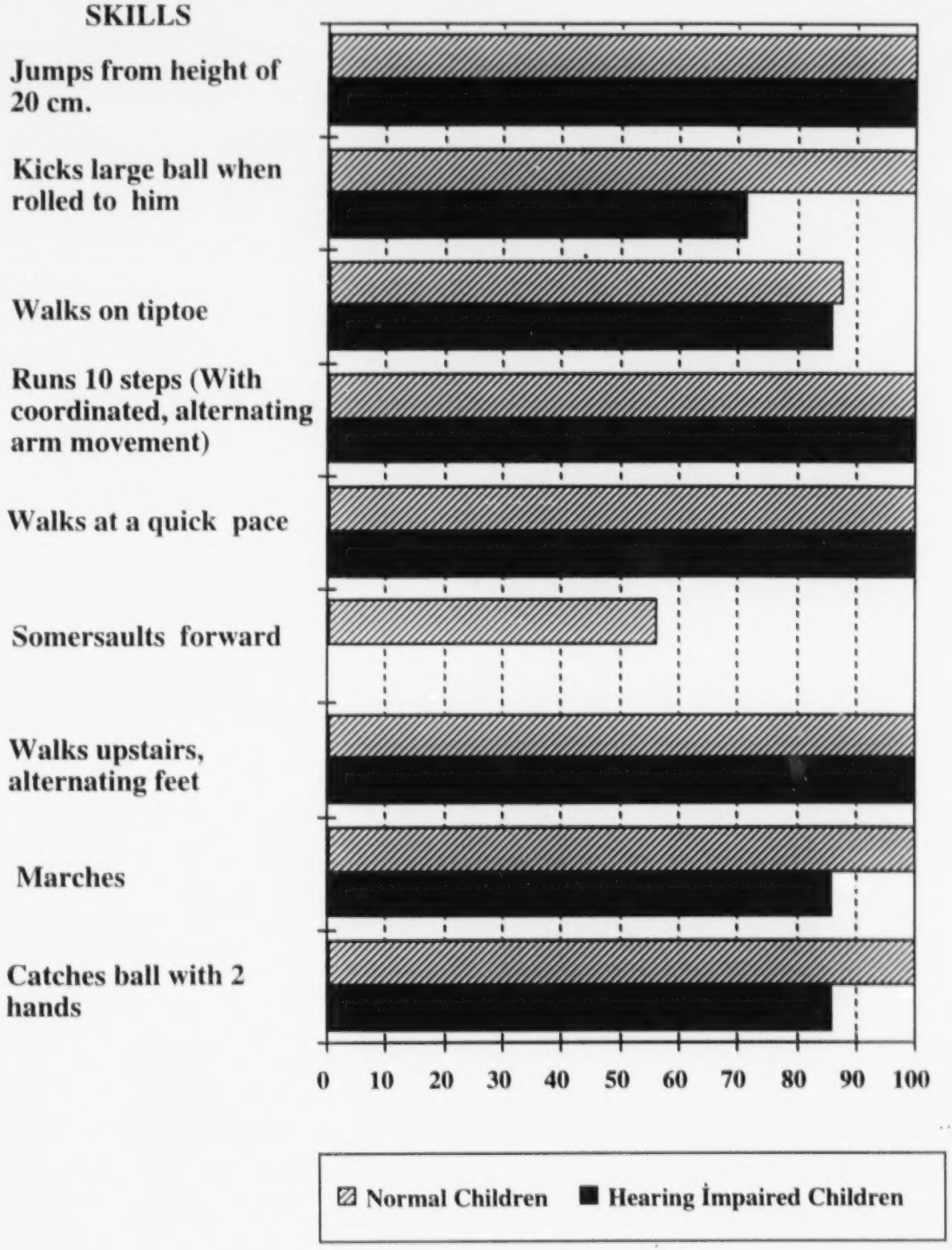

SKILLS
Jumps from height of 20 cm.
Kicks large ball when rolled to him
Walks on tiptoe
Runs 10 steps (With coordinated, alternating arm movement)
Walks at a quick pace
Somersaults forward
Walks upstairs, alternating feet
Marches
Catches ball with 2 hands
0 10 20 30 40 50 60 70 80 90 100
Normal Children
Hearing İmpaired Children

Table 2 shows that both the normal children and those with serious hearing impairment achieved 100% success in performing the following items in the Portage Checklist: "Jumps from height of 20 cm",

"Runs 10 steps", "Walks at a quick step" and "Walks upstairs, alternating feet".

In performing the items "kicks large ball when rolled to him", "marches" and "catches ball with two hands", the normal children achieved 100% success while the hearing impaired children were successful in 71.43%-85.71% of cases. While 56.25% of the normal children were successful in performing "somersaults forward", none of the hearing impaired was successful (0.00%).

Table 3 and Figure 2 show the distribution of the skills associated with gross motor development in normal and hearing impaired children in the 4-5-year age group.

Table 3: Distribution of Skills Associated With Gross Motor Development in Normal As Well As Hearing Impaired Children in The 4-5 Year Age Group (Ankara, 1992).

Skills \ Children	Normal (n:16)		Hearing Impaired (n:6)	
	Successful		Successful	
	No	%	No	%
Stands on one foot without aid 4-8 seconds	16	100.00	3	50.00
Runs changing direction	16	100.00	6	100.00
Walks balance board	16	100.00	5	83.33
Jumps forward with both feet (10 times)	16	100.00	5	83.33
Jumps over string 5 cm. off the floor	16	100.00	5	83.33
Jumps backwards (6 times)	16	100.00	6	100.00
Bounces and catches large ball	14	87.50	5	83.33
Walk downstairs alternating feet	16	100.00	6	100.00
Pedals tricycle, turning corners	*IMP		*IMP	
Hops on one foot 5 successive times	16	100.00	4	66.67

* IMPOSSIBLE

Figure 2. Distribution Of Skills Associated With Gross Motor Development In Normal As Well As Hearing Impaired Children In The 4-5-Year Age Group (Ankara, 1992).

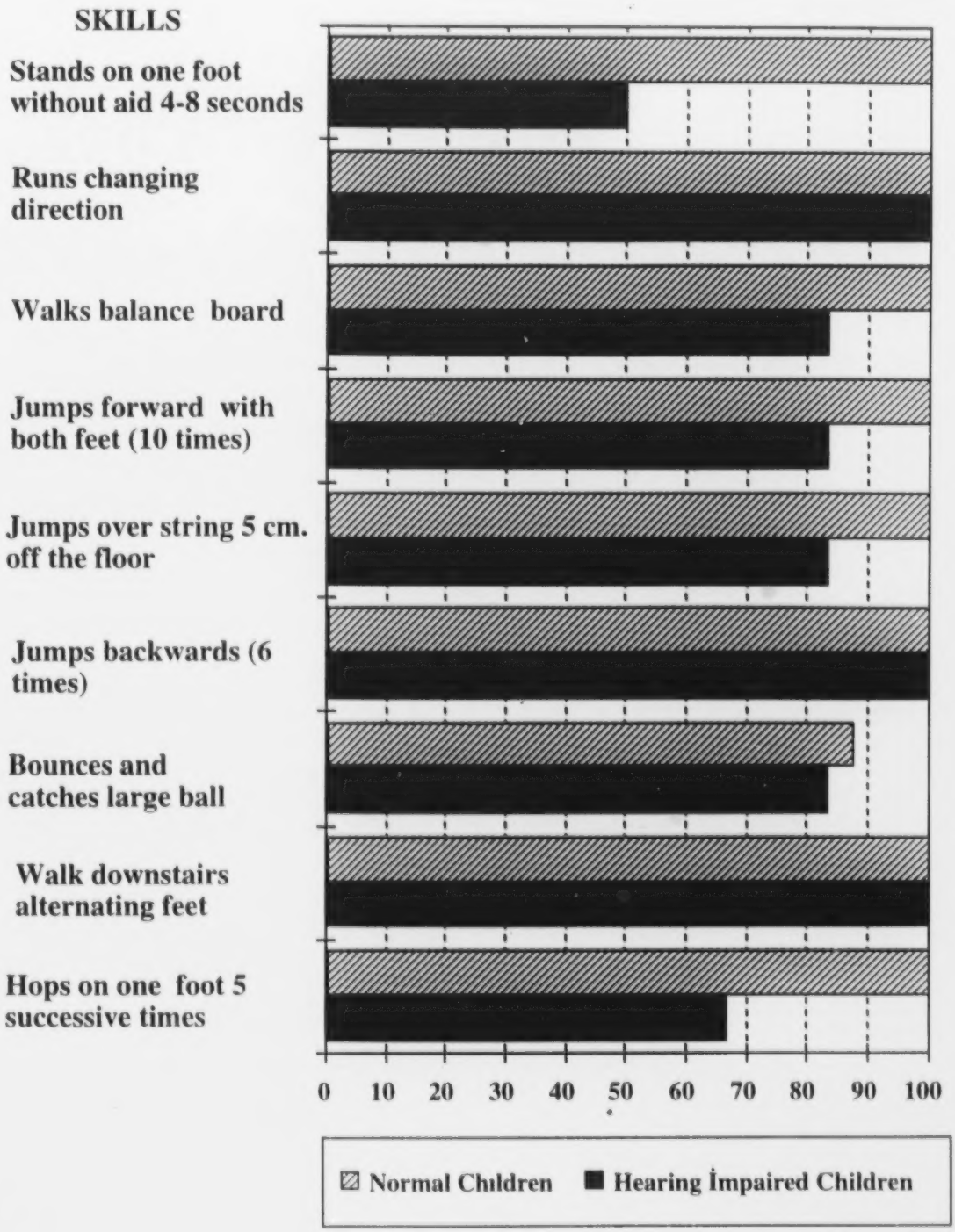

SKILLS
Stands on one foot without aid 4-8 seconds
Runs changing direction
Walks balance board
Jumps forward with both feet (10 times)
Jumps over string 5 cm. off the floor
Jumps backwards (6 times)
Bounces and catches large ball
Walk downstairs alternating feet
Hops on one foot 5 successive times
0 10 20 30 40 50 60 70 80 90 100
Normal Children
Hearing İmpaired Children

Table 3 shows that the 4 to 5-year-old normal children achieved 100% success in all items on the Portage Checklist except in "Bounces and catches large ball", in which the rate of success was 87.50%.

50% of the hearing impaired children was successful in performing the item "Stands on one foot without aid 4-8 seconds", and 66.67% in "Hops on one foot 5 successive times".

Their success rate ranged from 83.33% to 100% in other items.

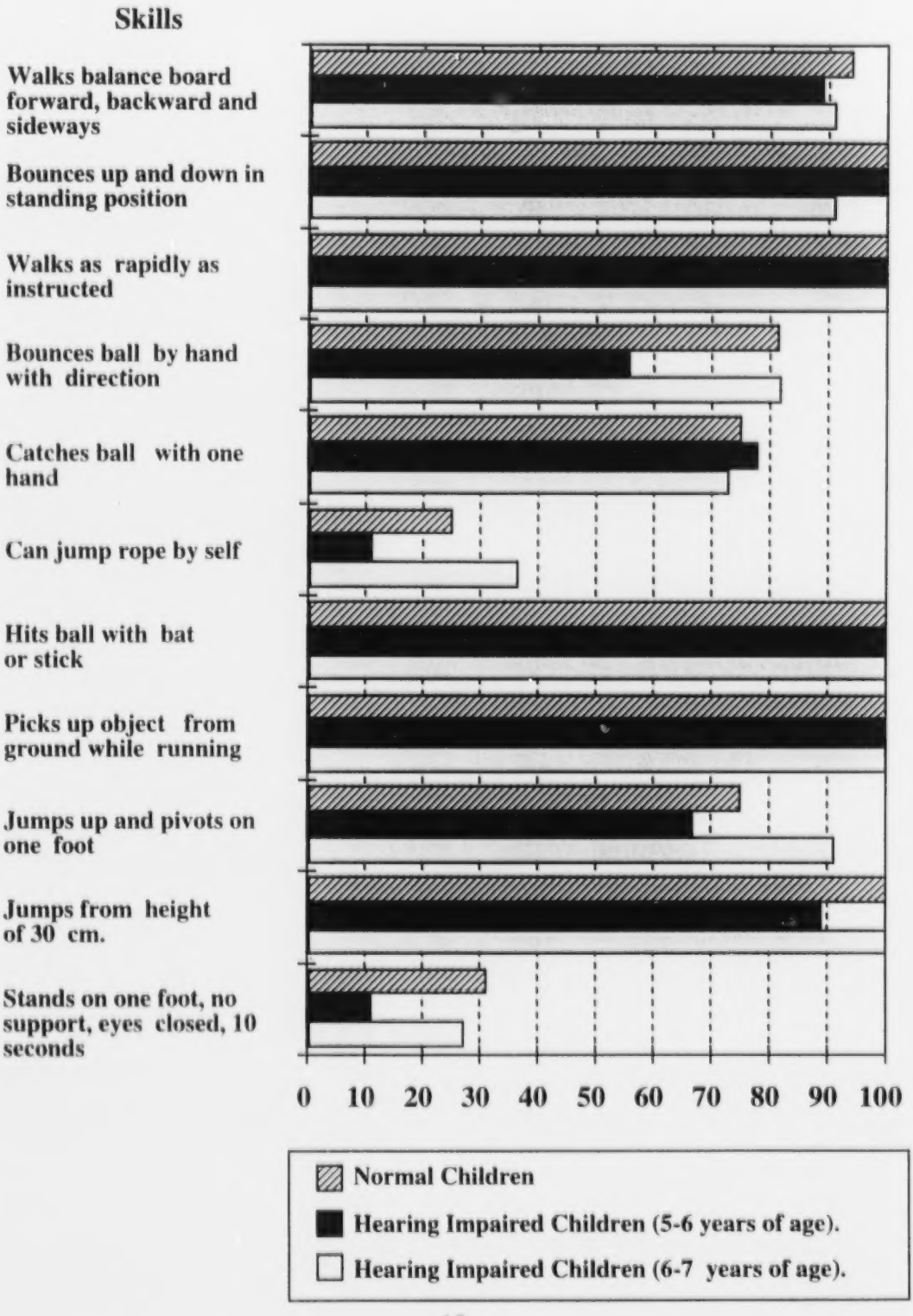
Table 4 and Figure 3 show the distribution of the skills associated with gross motor development in 5-6-year-old normal children and 6-7-year-old hearing impaired children.

Table 4: The Distribution of Skills Associated With Gross Motor Development in 5-6-Year-Old Normal Children and in 5-6 and 6-7-Year-Old Hearing Impaired Children (Ankara, 1992).

Skills \ Children	5 to 6-year old Normal Children (n:16)		Hearing Impaired Children Aged 5-6 (n:9)		Hearing Impaired Children Aged 6-7 (n:11)	
	Successful		Successful		Successful	
	No	%	No	%	No	%
Walks balance board, forward, backward and sideways	15	93.75	8	88.88	10	90.91
Bounces up and down in standing position	16	100.00	9	100.00	10	90.91
Walks as rapidly as instructed	16	100.00	9	100.00	11	100.00
Climbs step ladders on steps 4 meters high to slide	*IMP		*IMP		*IMP	
Bounces ball by hand with direction	13	81.25	5	55.56	9	81.82
Catches ball with one hand	12	75.00	7	77.78	8	72.73
Can jump rope by self	4	25.00	1	11.11	4	36.36
Hits ball with bat or stick	16	100.00	9	100.00	11	100.00
Picks up object from ground while runing	16	100.00	9	100.00	11	100.00
Skates forward 3 m.	*IMP		* IMP		*IMP	
Rides bicycle	*IMP		*IMP		*IMP	
Slides on sledge	*IMP		*IMP		*IMP	
Walks or plays in water waist-high in swimming pool	*IMP		*IMP		*IMP	
Steers wagon, propelling with one foot	*IMP		*IMP		*IMP	
Jumps up and pivots on one foot	12	75.00	6	66.67	10	90.91
Jumps from height of 30 cm.	16	100.00	8	88.88	11	100.00
Stands on one foot, no support, eyes closed, 10 seconds	5	31.25	1	11.11	3	27.27
Hangs 10 seconds from horizontal bar bearing own weight or arms	*IMP		*IMP		*IMP	

* IMPOSSIBLE

Figure 3. The Distribution of Skills Associated With Gross Motor Development In 5-6-Year-Old Normal Children And In 5-6 And 6-7-Year-Old Hearing Impaired Children (Ankara, 1992).


Skills
Walks balance board forward, backward and sideways
Bounces up and down in standing position
Walks as rapidly as instructed
Bounces ball by hand with direction
Catches ball with one hand
Can jump rope by self
Hits ball with bat or stick
Picks up object from ground while running
Jumps up and pivots on one foot
Jumps from height of 30 cm.
Stands on one foot, no support, eyes closed, 10 seconds
0 10 20 30 40 50 60 70 80 90 100
Normal Children
Hearing Impaired Children (5-6 years of age).
Hearing Impaired Children (6-7 years of age).

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As shown in Table 4, 25% of the 5-6-year-old normal children performed successfully in the item "Can jump rope by self" and 31.25% in "Stands on one foot, eyes closed, 10 seconds". Their success rate ranged from 75% to 100% in performing other items on the checklist for this age group.

5 to 6-year-old hearing impaired children also performed poorly where normal children in the same age group performed poorly. In items on the Portage Checklist for this age group. For instance, their success rate in "Can jump rope by self", and "Stands on one foot, eyes closed, 10 seconds" was a mere 11.11%.

On the other hand, the hearing impaired children in the age group of 6-7-years achieved 36.36% success in "Can jump by self", and 27.27% success in "Stands on one foot, eyes closed, 10 seconds".

While 81.25% of the 5-6 year-old normal children were successful in performing the item "Bounces ball by hand with direction". 55.56% of the hearing impaired children in the same age group performed successfully. By contrast, the hearing impaired children in the 6-7-year age group achieved a success rate of 81.82% in the same item.

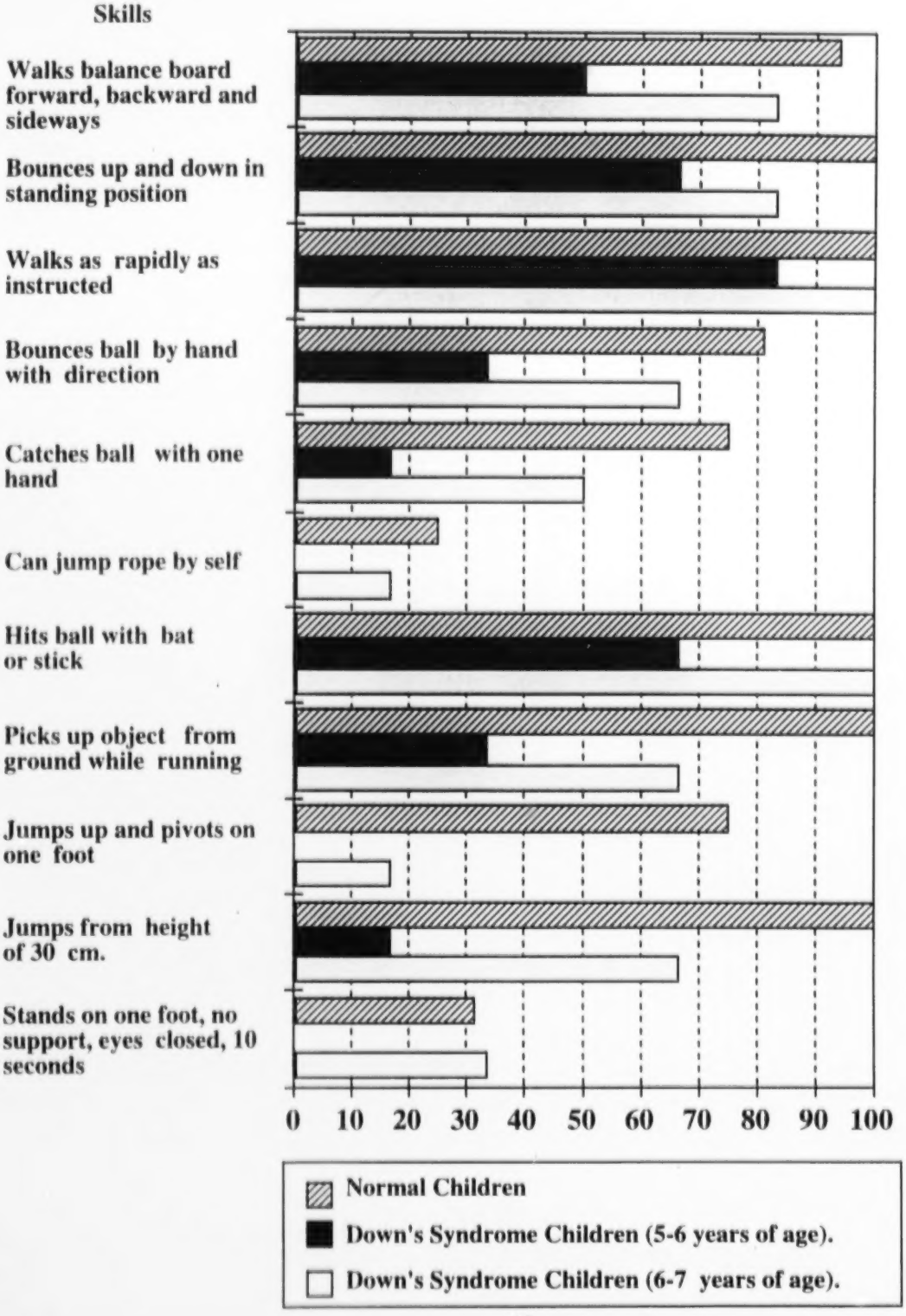
Table 5 and Figure 4 show the distribution of the skills associated with gross motor development in 5-6-year-old normal children and in 5-6-year,old as well as 6-7-year-old children with Down's syndrome.

Table 5 :Distribution of Skills Associated With Gross Motor Development in 5-6-Year Old Normal Children and in 5-6 As Well As 6-7-Year-Old Children With Down's Syndrome (Ankara, 1992).

Skills \ Children	Normal Childen Aged 5-6 (n:16)		Children With Aged 5-6 (n:6)		Down's Syndrome Aged 6-7 (n:6)	
	Successful		Successful		Successful	
	No	%	No	%	No	%
Walks balance board forward, backward and sideways	15	93.75	3	50.00	5	83.33
Bounces up and down in standing position	16	100.00	4	66.67	5	83.33
Walks as rapidly as instructed	16	100.00	5	83.33	6	100.00
Climbs step ladders or steps 3 m. high to slide	*IMP		*IMP		*IMP	
Bounces ball by hand with direction	13	81.25	2	33.33	4	66.67
Catches ball with one hand	12	75.00	1	16.67	3	50.00
Can jump rope by self	4	25.00	0	0.00	1	16.67
Hits ball with bat or stick	16	100.00	4	66.67	6	100.00
Picks up object from ground while running	16	100.00	2	33.33	4	66.67
Skates forward 3 meters	*IMP		* IMP		*IMP	
Rides bicycle	*IMP		*IMP		*IMP	
Slides on sledge	*IMP		*IMP		*IMP	
Walks or plays in water waist high in swimming pool	*IMP		*IMP		*IMP	
Steers wagon, propelling with one foot	*IMP		*IMP		*IMP	
Jumps up and pivots on one foot	12	75.00	0	0.00	1	16.67
Jumps from height of 30 cm.	16	100.00	1	16.67	4	66.67
Stands on one foot, no support, eyes closed, 10 seconds	5	31.25	0	0.00	2	33.33
Hangs 10 seconds from horizontal bar bearing own weight or arms	*IMP		*IMP		*IMP	

* IMPOSSIBLE

Figure 4. Distribution Of Skills Associated With Gross Motor Development In 5-6-Year-Old Normal Children And In 5-6 As Well As 6-7-Year-Old Children With Down's Syndrome (Ankara, 1992).


Skills
Walks balance board forward, backward and sideways
Bounces up and down in standing position
Walks as rapidly as instructed
Bounces ball by hand with direction
Catches ball with one hand
Can jump rope by self
Hits ball with bat or stick
Picks up object from ground while running
Jumps up and pivots on one foot
Jumps from height of 30 cm.
Stands on one foot, no support, eyes closed, 10 seconds
0 10 20 30 40 50 60 70 80 90 100
Normal Children
Down's Syndrome Children (5-6 years of age).
Down's Syndrome Children (6-7 years of age).

18

As shown in Table 5, 5-6-year-old normal children achieved a success rate of 25% in "Can jump rope by self", and 31.25% in "Stands on one foot, eyes closed, 10 seconds".

By contrast, the success rate achieved in these skills by the children with Down's syndrome in the same age group was (0.00)%. They were not successful in the skill "Jumps up and pivots on one foot", either (0.00%). However, the 6-7-year-old children with Down's syndrome achieved a success rate of 16.67% in "Can jump rope by self", and 33.33% in "Stands on one foot, no support, eyes closed, 10 seconds".

In other skills on the Portage checklist where 5-6-year-old normal children achieved a success rate ranging between 75.00% and 100.00%, the children with Down's syndrome had a success rate changing between 16.67% and 83.33%.

However, the level of successful performance achieved by 6-7-year-old children with Down's syndrome was closer to that by 5-6-year-old normal children.

The successful performance rates achieved by 6-7-year-old with Down's syndrome and 5-6-year old normal children differed significantly only in the skill "Jumps up and pivots on one foot". Normal children had a success rate of 75.00% whereas those with Down's syndrome 16.67%.

DISCUSSION

This study examined the skills associated with gross motor development in 3-6-year-old normal children, 3-7-year-old hearing impaired children and 5-7-year-old children with Down's syndrome on the basis of the Portage Early Childhood Educational Program Motor Development Checklist.

Table 2 shows that both normal and hearing impaired children achieved a success rate of 100% in performing the following skills on the Portage Checklist: "Jumps from height of 20 cm." "Runs 10 steps", "Walks at a quick pace", and "Walks upstairs, alternating feet".

While the successful performance rate achieved by 3-4-year-old normal children in "Kicks large ball when rolled to him", "Marches", and "Catches ball with two hands", that achieved by hearing impaired children changed from 71.43% to 85.71%.

The low success rates achieved by hearing impaired children in the skills mentioned can be accounted for by the difficulties they suffer in hand-eye-foot coordination.

It was also stated in a study by Wiegersma and Van der Velde (1983) that hearing impaired children had difficulties of general coordination (4).

Of the skills on the Portage checklist, "Walks on tiptoe" was performed at a success rate of 87.50% by normal children whereas at

85.71% by hearing impaired children. In "Somersaults forward", normal children performed with 56.25% success; however, none of the hearing impaired children was successful in this skill (0.00%).

The low success rates achieved by the children in both groups in the skill "somersaults forward" can be attributed to the failure of the educational programs to allow for any systematic physical activities designed to contribute to motor development. In addition, the fact that none of the hearing impaired children in the study was able to perform this skill successfully can be ascribed to the fact that the parents and teachers of such children assumed a protective attitude towards them because they were wearing hearing aid.

Table 3 shows that the 4-5-year-old normal children included in the study achieved a success rate of 100% in all skill areas on the Portage Checklist except in "Bounces and catches ball", in which their success rate was 87.50%.

The hearing impaired children achieved a success rate of 50% in performing the skill "Stands on one foot, no support, 4-8 seconds", and 66.67% in "Hops on one foot five successive times". On the other hand, their success rate in other skill areas ranged from 83.33% to 100%.

When one considers the skill areas in which the hearing impaired children in the study performed less successfully than the normal children, he will see that the skills involved are those that have to do with "balance". The available literature dealing with this subject also shows

that hearing impaired children have certain balance and general coordination problems in addition to some visual motor difficulties (4).

In a study they carried out, Wiegersma and Van der Velde stated that hearing impaired children performed less successfully than normal children in "Walks balance board forward and backward, hops and jumps" (4).

Table 4 shows that the normal children included in the study achieved a success rate of 25% in performing the skill "Can jump rope by self" and 31.25% in "Stands on one foot, eyes closed, 10 seconds". However, their success rate in other skill areas varied between 75% and 100%.

In skill areas in which the normal children in the study achieved low performance rates, the hearing impaired children also performed poorly. For instance, their success rate was 11.11% in "Can jump rope by self" and "Stands on one foot, eyes closed, 10 seconds".

On the other hand, the hearing impaired children in the 6-7-year age group attained a success rate of 36.36% in "Can jump rope by self" while their successful performance rate was 27.27% in "Stands on one foot, eyes closed, 10 seconds".

By contrast, in "Bounces ball by hand with direction", the successful performance rates achieved by the 5-6-year-old normal children and the hearing impaired children in the same age group were 81.25% and 55.56% respectively, however, the rate attained by the hearing impaired children in the 6-7-year age group was 81.82%.

If the results shown in Table 4 are broadly assessed, we can see that where normal children perfomed poorly the hearing impaired children also exhibited poor performance.

This inadequacy on the part of the normal children can be ascribed to the fact that educational programs do not make room for more frequent and more systematic physical exercises.

As mentioned earlier the hearing impaired children included in this study were less successful in performing certain skills than the normal subjects. This fact may result from some balance and general coordination difficulties hearing impaired children suffer from. On the other hand, 6-7-year-old hearing impaired children did better in skill areas in which 5-6-year-old hearing impaired children performed less successfully than normal children. In other words, a hearing impaired child can perform what a 5-6-year-old normal child can only when he is 6-7 years of age.

Table 5 shows that the normal subjects in the 5-6-year age group achieved a success rate of 25% in "Can jump rope by self", and 31.25% in "Stands on one foot, no support, eyes closed, 10 seconds".

By contrast, the subjects with Down's syndrome in the same age group attained no success in the same skill areas (0.00%). However, those subjects with Down's syndrome in the 6-7-year age group had a success rate of 16.67% in "Can jump rope by self", and 33.33% in "Stands on one foot no support, eyes closed, 10 seconds".

In other items on the Portage Checklist in which 5-6-year-old normal subjects performed at a success rate ranging from 75.00%-100.00%, the subjects with Down's syndrome in the same age group achieved a successful performance rate of 16.67%-83.33%. However the successful performance rates achieved by the subjects with Down's syndrome in the 6-7-year age group seem to be closer to those achieved by 5-6-year-old normal subjects. Only in one skill area was there significant difference between the performance levels of 5-6-year-old normal subjects and 6-7-year-old subjects with Down's syndrome: "Jumps up and pivots on one foot". (Normal subjects: 75.00%; subjects with Down's syndrome: 16.67%).

Those skills on the checklist which were impossible to observe have been marked "IMP" on the tables. This impossibility was due to the fact that the schools in which the assesments were made lacked the environment and equipment required to observe the skills in question.

The available literature on the subject also points out, in agreement with our observation, that children with Down's syndrome have slower (gross) motor development than normal children or even mentally retarded children with a similar I.Q. (4).

Due to hypotonic muscles, children with Down's syndrome experience balance locomotion and hand-eye-foot coordination problem as well as difficulties in motor skills related to rapid movement.

CONCLUSIONS AND SUGGESTIONS

Our study found that motor skills developed more slowly in hearing impaired children and children with Down's syndrome than in normal children. Compared to normal children, hearing impaired children were less successful in performing the skills related to balance and general coordination than in other skill areas because of the disadvantages arising from their impairment (vestibular and neurological defects).

Our study also found that due to hypotonic muscles, children with Down's syndrome, generally spealing, attained a lower level of performance in all motor skills than normal children.

In addition to the disadvantages caused by their handicaps, the following may have been responsible in both groups for the low level of performance in motor skills:

1. Overprotection extended to such children by their parents, and

2. Lack of facilities that encourage activity (Such as bicycle and roller-skate paths; running tracks; gymnasiums; basketball-voleyball and tennis courts; swimming pools; green areas).

The inadequacies in basic motor skills encountered in such children may be diminished through training in motor skills and facilities that encourage activity.

Inclusion of systematic physical education activities in school programs for normal as well as handicapped children may contribute to their motor development.

The physical training provided by schools alone is insufficient for normal as well as handicapped children. It should be supplemented by out-of-school activities, which require facilities such as gymnasiums, playgrounds, sports fields (basketball-voleyball and tennis courts, running tracks, bicycle paths, etc). Local governments should do their best to provide such facilities for children. In addition, parents should be helped to develop an awareness of the importance of sports activities through the media.

Sports, related facilities and activities should be planned in cooperation with volunteers, local governments and the concerned ministries in such a way that they are accessible for children and parents in their own neighbourhoods. It should not be forgotten that such facilities will especially benefit the development of handicapped children.

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